O.P.Code: 23CS0519   R23   H.T.No. ☐☐☐☐☐☐☐☐☐☐

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. III Year I Semester Regular Examinations December-2025
INTRODUCTION TO QUANTUM TECHNOLOGIES AND APPLICATIONS
(Common to All)

Time: 3 Hours   Max. Marks: 70

PART-A

(Answer all the Questions 10 x 2 = 20 Marks)

1	a	State Heisenberg's Uncertainty Principle.	CO1	L2	2M
	b	What is meant by quantization of energy levels?	CO1	L1	2M
	c	Compare quantum coherence and decoherence.	CO2	L2	2M
	d	What is the role of spin in representing a qubit?	CO2	L1	2M
	e	Discuss one role of quantum software in managing hardware limitations.	CO3	L2	2M
	f	Define decoherence in the context of quantum systems.	CO3	L1	2M
	g	What is Quantum Key Distribution (QKD)?	CO4	L1	2M
	h	List any two differences between classical and quantum gates.	CO4	L2	2M
	i	What is the primary focus of Psi Quantum in the quantum industry?	CO5	L1	2M
	j	Why is standardization a challenge for quantum technology adoption?	CO5	L2	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Illustrate the strategic importance of quantum technologies in modern science and defense.	CO1	L3	5M
	b	Describe the concept of quantum states and explain how measurement affects the state.	CO1	L3	5M

OR

3		Express the global efforts in quantum research: compare initiatives of India, USA, EU, and China.	CO1	L3	10M

UNIT-II

4		How does randomness arise in quantum mechanics? Compare this with determinism in classical systems.	CO2	L2	10M

OR

5	a	Explain quantum decoherence with an example.	CO2	L2	5M
	b	Compare spin-based qubits with polarization-based qubits.	CO2	L3	5M

UNIT-III

6	a	Evaluate scalability issues in building large-scale quantum computers.	CO3	L3	5M

OR

7	a	Why are quantum systems fragile? Discuss about the role of decoherence?	CO3	L2	5M
	b	Explain the effect of noise and control challenges in quantum systems.	CO3	L2	5M

UNIT-IV

8		Analyze the challenges in quantum communication and computing, such as decoherence, and propose theoretical solutions.	CO4	L3	10

OR

9	a	Illustrate the idea of the Quantum Internet and its potential for global secure networking.	CO4	L3	5
	b	Describe the real-world importance of quantum technologies in communication and computing.	CO4	L3	5

UNIT-V

10	a	Discuss India's educational and research landscape in quantum technology and its global positioning in the quantum race.	CO5	L2	5

OR

11	a	Explain about quantum computing is applicable in healthcare and medical.	CO5	L2	5
	b	Discuss about the current educational and research initiatives driving quantum technology growth worldwide.	CO5	L2	5

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